Mode of Entry by the "Parasitoid" Maggot of the Cane Weevil Tachinid, *Lixophaga sphenophori* (*Villeneuve*) (Diptera: Tachinidae), into the New Guinea Sugarcane Weevil Larva, *Rhabdoscelus obscurus* (Boisduval) (Coleoptera: Curculionidae)

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The parasitoid Lixophaga *sphenophori* was introduced into Hawaii from New Guinea in 1910, by Dr. Muir of the Hawaiian Sugar Planters Association Experiment Station as a biological control agent to combat the destructive *R. obscurus* (Williams, 1931). Although it was known that the first instar larva actively enters its host, the internal, and exit activities of the parasite in its host were not known until I studied and observed these activities (Olson, 1970). In this study, the mode of entry of the larva into its host is described.

METHODS

Observations were made of eight *R. obscurus* larvae on which maggots of *L. sphenophori* were manually placed.

To obtain maggots for the experiments, the abdomens of adult female *Lixophaga* were severed from the thorax with a knife. The ovaries, containing both mature and developing maggots, were removed with a pin probe.

The first three *R. obscurus* larvae observed were placed in a plastic capsule cover (dorsum up) and maggots of *L. sphenophori* were placed on the dorsal surface with an eye dropper. Each time the larvae were able to dislodge the maggots by vigorous body contortions and intensified movements.

The third larva, therefore was pinned to the plastic cover to restrict its movements thus reducing the incidence of parasites being shed. A maggot was observed rising through the body fluid inside the larva, which suggested entry had been achieved ventrally.

The fourth larva was pinned (venter up) in a dissecting dish. The ovary taken from an adult *L. sphenophori* was put on the venter of the larva. The ovary encasing the maggots was pierced by a pin to expedite egress of the maggots. Entry was observed on larva number four and repeated and confirmed on larvae five through eight.

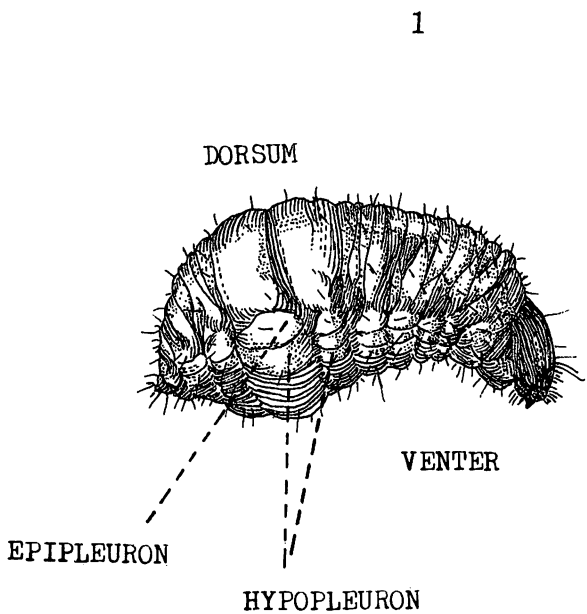


FIG. 1. *Rhabdoscelus obscurus* larva.

Results and Discussion

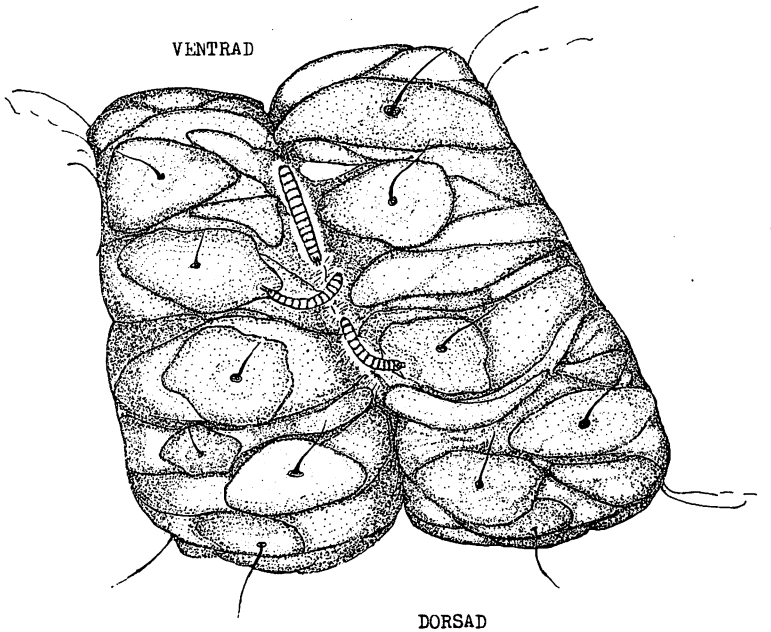
It took the maggots of *L. sphenophori* 4–15 minutes to gain entry into the bodies of their host. Mode of entry seemed to be directly related to the stage of development and vigor of the maggots. Obviously active and vigorous maggots gained entry in 4 minutes, whereas the less active maggots took up to 15 minutes.

A total of 10 *L. sphenophori* larvae were observed penetrating the bodies of larvae four through eight. In each case, entry was through the base of a membranous hypopleuron or an epipleuron (Chu, 1949). The maggot pierced the base of a hypo-epipleuron with its mouth hooks and, with a series of undulating and constricting movements, worked each body segment in sequence through the minute puncture until entry was accomplished.

The maggot occupied the hollow space in the hypo-epipleuron for a period of time sufficient to allow the entry wound to heal before working its way into the body fluid and eventually attaching to a spiracle.

Summary

Successful penetration by the maggots of *Lixophaga sphenophori* into the body of an *R. obscurus* larva is directly related to the vigor of the



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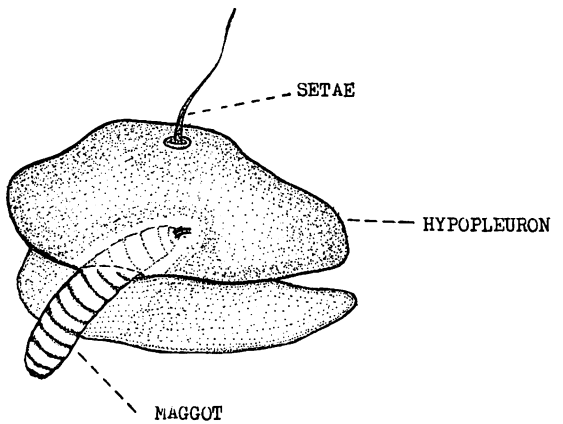

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FIG. 2. Pleural segments of *R. obscurus* with *Lixophaga sphenophori* maggots.
FIG. 3. *Lixophaga sphenophori* penetrating at the base of a hypopleuron.

larviposited parasite. *R. obscurus* appears to be aware of the maggots and twists frantically to dislodge them. .

A *L. sphenophori* maggot gains entry into *R. obscurus* larva by making an incision or puncture with its mouth hooks in the base of a hypopleuron or an epipleuron and then pulls itself through the minute hole by undulative and constrictive movements of its body. After entry, the maggot remains quiscent in the hollow confines of the hypo-epipleuron. This delay or pause, whether by design or otherwise, serves to allow the entry wound to heal.

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